

Koch, Kristine

From: Koch, Kristine
Sent: Thursday, September 04, 2014 2:52 PM
To: MCCLINCY Matt; Shephard, Burt
Cc: HAFLEY Dan; RYALS Cindy; LARSEN Henning
Subject: RE: Update on review of manganese water quality criteria from LWG for Portland Harbor

Thanks Matt. Timing for comments works is acceptable. I will work with Burt on getting the data validated.

Kristine Koch
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From: MCCLINCY Matt [mailto:MCCLINCY.Matt@deq.state.or.us]
Sent: Thursday, September 04, 2014 2:37 PM
To: Shephard, Burt; Koch, Kristine
Cc: HAFLEY Dan; RYALS Cindy; LARSEN Henning
Subject: RE: Update on review of manganese water quality criteria from LWG for Portland Harbor

Hi Kristine,

We had a good discussion with Burt this afternoon. It looks like the issues he identify are consistent with our review. It also looks like everyone was in general agreement with the methodology but that some of the details still need to be vetted/confirmed. I understand that Burt will be following up with you and the LWG on these details. We plan on providing written feedback to EPA on the LWG memo, but will not be able to do so for 2 weeks given Cindy Ryal's work load. Cindy is the toxicologist who is supporting the DEQ Cleanup Program Manganese Work Group. One topic discussed was the need to validate the unpublished Parmetrix data used by the LWG. This is an element of the review that we encourage EPA to consider.

Matt McClincy

From: Shephard, Burt [mailto:Shephard.Burt@epa.gov]
Sent: Thursday, September 04, 2014 12:06 PM
To: MCCLINCY Matt
Cc: HAFLEY Dan
Subject: FW: Update on review of manganese water quality criteria from LWG for Portland Harbor

Matt, Dan,

Here's what I sent Kristine Koch earlier today.

Best regards,

Burt Shephard
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"Facts are stubborn things"
- John Adams

From: Shephard, Burt
Sent: Thursday, September 04, 2014 11:43 AM
To: Koch, Kristine
Subject: Update on review of manganese water quality criteria from LWG for Portland Harbor

Kristine,

The LWG's calculation methodology is sound, it's the same hardness-dependent toxicity method EPA has used for a number of water quality criteria for metals which are more toxic in soft water, less toxic in harder water. Note that the hardness adjustment range is 25 – 400 mg/L as CaCO₃, several of the TZW locations have water harder than 400 mg/L, so the proposed criteria wouldn't apply in any event.

So far I can recreate their acute toxicity value equation, as well as their normalizations of the raw toxicity data to a standard hardness of 50 mg/L. For reference, the Willamette River hardness ranges between about 25 – 30 mg/L hardness, we used 28 mg/L hardness in the BERA. That is considered to be soft water.

Empirical toxicity data exists for all eight of the taxonomic groups required to derive acute water quality criteria as per EPA guidance (Stephan et al. 1985). Thus, the LWG derivation of the acute criteria equation follows EPA guidance. There is not empirical toxicity data to directly calculate a chronic water quality criterion, only 7 of the 8 required taxonomic groups have acceptable chronic empirical data. Therefore, LWG adjusted the acute criteria equation by a Mn specific acute-chronic ratio (ACR) to develop their chronic criteria equation. This ACR approach also follows EPA criteria development guidance.

Not sure why LWG spent two pages trying to discount the empirical *Hyaella azteca* chronic survival studies, both the 28 day and 35 day survival results most certainly do meet bioassay test acceptability criteria for a chronic study. But even if LWG included the empirical chronic *Hyaella* data, they still come up one required taxa short of the eight required taxa, and still need to use an acute-chronic ratio in conjunction with their acute criteria equation to derive a chronic criteria equation.

What I can't fully reproduce yet is their calculations of the acute-chronic ratio the LWG used to adjust the acute criteria equation to a chronic criteria equation as presented in Table 3 of the LWG's August 1, 2014 memo on derivation of a proposed Mn PRG. Specifically, their brown trout chronic value is not the same as the chronic value in the Stubblefield and Hockett (2000) reference the LWG cites as the source of their brown trout chronic value. I also cannot reproduce their fathead minnow acute and chronic values. I can confirm the values of the remaining 11 acute-chronic toxicity pairs

in their Table 3 used to derive the acute-chronic ratio. Thus, I can't confirm the accuracy of their proposed 4.78 acute-chronic ratio, or their proposed chronic criteria equation.

If their chronic equation is correct, I can confirm the LWG's numeric chronic manganese concentrations that come out of the equation. They're in the little table below. For comparison, I've also included the EPA approved chronic manganese criteria values for use in Colorado and New Mexico.

Hardness (mg/L as CaCO ₃)	Colorado chronic Mn criteria (µg/L)	LWG proposed chronic Mn criteria (µg/L)
25 (lowest hardness adjustment value)	1040	742
28 (Willamette River)	1080	807
50	1309	1242
57 (crossover hardness)	1368	1369
100	1650	2077
200	2078	3475
300	2379	4696
400 (highest hardness adjustment value)	2618	5814

Interesting to note that in soft water such as in the Willamette River itself, the LWG chronic values are more protective than the EPA approved chronic manganese criteria approved for use in Colorado and New Mexico, but are less protective in hard water than the Colorado and New Mexico Mn criteria. The crossover point, where the Colorado and LWG chronic criteria are the same is at 57 mg/L hardness, approximately twice the hardness of the Willamette River.

Best regards,

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